

## **IRRIGATED SUGARCANE: AN ENVIRONMENTALLY FRIENDLY C-SEQUESTRATION C4-CROP**

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Commercial sugarcane is a semi-perennial C4 crop usually harvested each 12 months. Stalk yields exceeding 100 t/ha/year are obtained with best farming practices in warm areas with high net radiation, such as in the semiarid zone. The C-level of grumulosic vertisols in Sudan under irrigated sugarcane for 15 years was compared with sugarcane under traditional dry-land farming. The analysis concerns also the bagasse production of the cane crop while it furnishes the energy needed by the mill and for the irrigation.

In the studied area, the cane crop is burned immediately before the harvest and, due to the presence of termites, all crop residues are burned before regrowth of the ratoon cane or cane planting.

The presented results are based on, (i) measurements of the organic C content and of the bulk density (at litre level, on field capacity) of the soils at four levels between 0 and 105 cm depth, and, (ii) general data concerning above-ground green matter production of cane at harvest as well as data on root growth.

In the first meter of the soil, irrigated sugarcane cropping boosted the C content by almost 30 % (115 vs. 84 C tons/ha) and by 82, 50, 7 and 9 % for the depths 0-15, 30-45, 60-75 and 90-105 cm respectively. Due to the burning of all crop residues, this increase in C is essentially due to the yearly root growth of the cane.

Considering the energetic aspect, at a mean cane stalk yield of 100 tCha<sup>-1</sup> or more, the burning in the mill of the bagasse by-product covers during the crushing season, largely caters for the energy need of the sugar mill as well as those used by the neighbouring township and for the irrigation of the cane fields. Moreover, if a significant improvement of the conversion into energy of the bagasse is realised (the current conversion efficiency is 15 to 20 % but it may reach 30 to 35 % with high pressure technology), it will be possible not only to recover the energy needs for year round irrigation, but also the energy that is required for the manufacturing of the fertilizers and mechanical operations involved in cane production.

In conclusion: in semi-arid areas, well-managed sugarcane is a crop that presents the advantage to increase, over a 15 year period, the carbon content of the soil to a much higher level (+ 30 %, i.e. + 30 tCha<sup>-1</sup>) than is observed under traditional rainfed farming. On the other hand, by the efficient burning of bagasse, this crop may produce more energy than needed for its production and processing. At the same time, cane growing produces more than 10 t sugar and several tonnes of molasses per ha, which are very energetic C rich products.

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